

**NORTHROP GRUMMAN**

DEFINING THE FUTURE

# NASA Earth Science and Applications

Strategic Roadmap Committee

Vision

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FROM UNDERSEA TO OUTER SPACE TO CYBERSPACE



# NASA Environmental Science Missions

AQUA



AURA



- **NG has a long history of building small, medium, and large science missions, and instruments**
- **What are the missions of the future?**

**These science missions have been used in time of need for both military and civilian operational purposes**

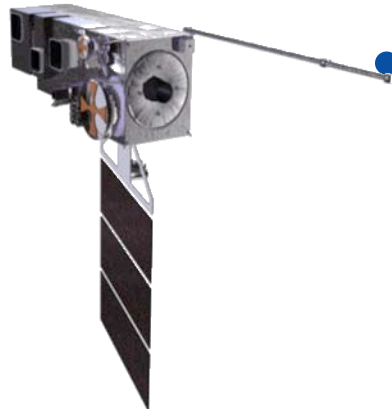
# NOAA Environmental Operational Missions



- **NG shares system performance responsibility with USG as prime contractor**
- **Sensor Operational Algorithm Teams, stringent calibration & validation, and strict orbit management provide science capability**

**This operational mission has significant climate science content**

# NOAA Environmental Operational Missions



- **NG is a competitor for GOES-R**
- **Expect sensor algorithm teams, stringent calibration& validation, and strict orbit management for science capability**

**Geosynchronous Operational  
Environmental Satellite**

**This operational mission will probably  
have significant science content**

## NASA/NOAA Environmental Missions

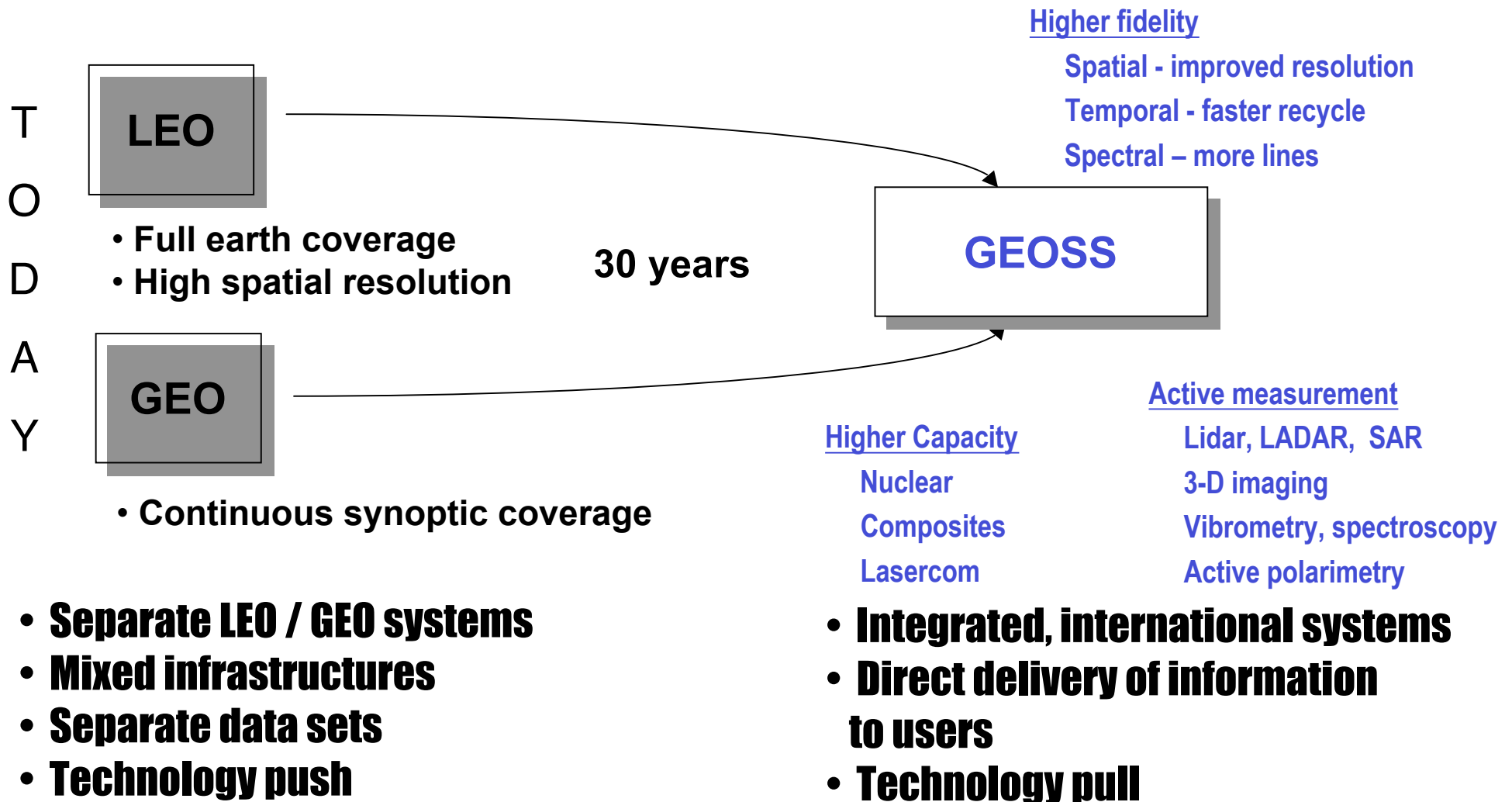
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- **NG is prime contractor for the USAF Global Hawk UAV**
- **Transitioning early UAVs to NASA Dryden for science and operational [NOAA] environmental collection programs**

**This operational platform is transitioning for environmental science and operational use**

# Long TERM Environmental Evolution



## Global Earth Observation System of Systems

# GEOSS

## Global Earth Observation System of Systems (GEOSS)

US

Int'l

**GEOSS  
international  
plan Reference  
Document**

**10-year  
international  
plan**

**Earth Obs Summit  
III Brussels  
February 2005  
Deliver 10-Year plan**

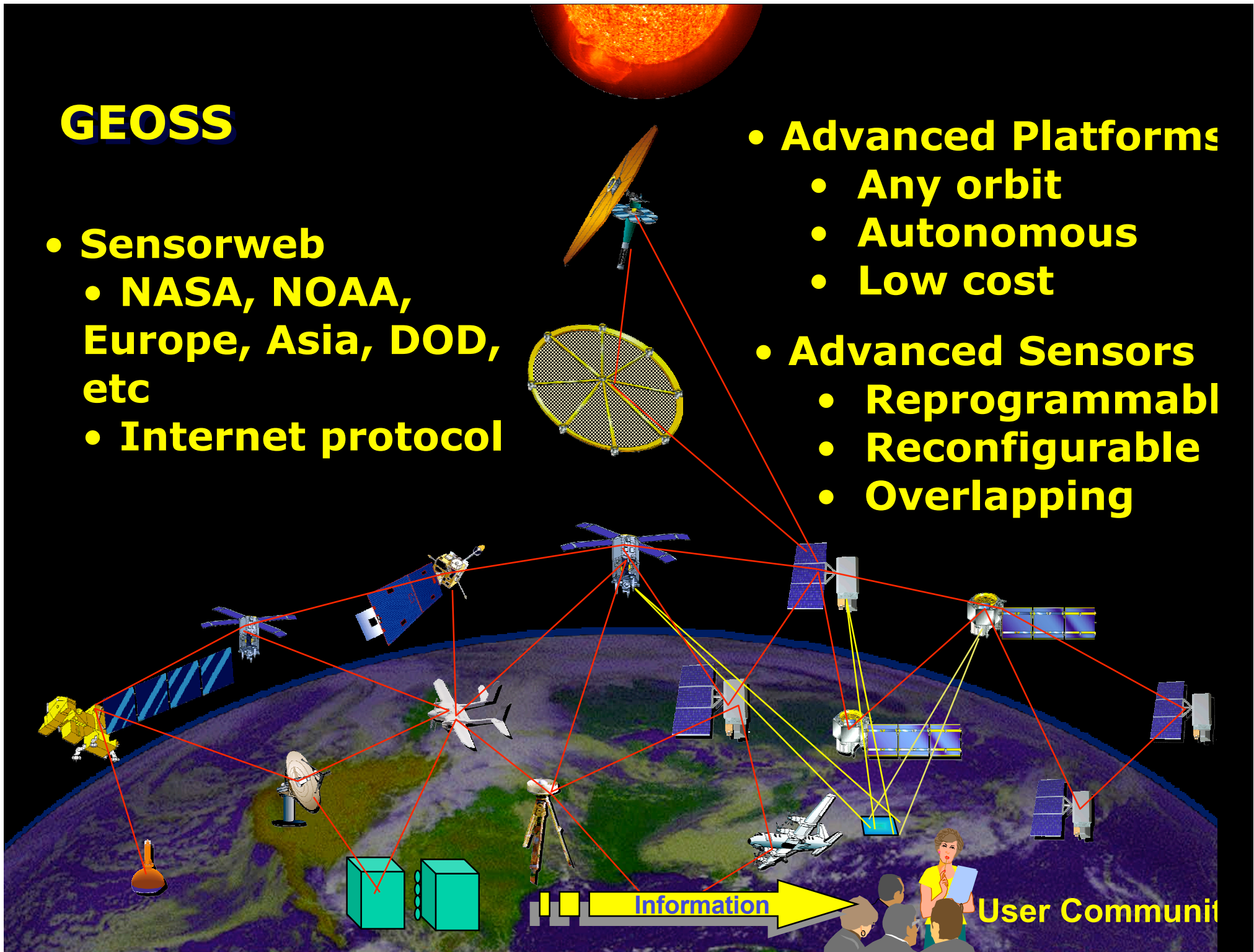
- **Weather**
- **Disasters**
- **Oceans**
- **Climate**
- **Agriculture**

- **Human Health**
- **Ecology**
- **Water**
- **Energy**

# GEOSS

- **Sensorweb**
  - NASA, NOAA, Europe, Asia, DOD, etc
  - Internet protocol

- **Advanced Platforms**
  - Any orbit
  - Autonomous
  - Low cost
- **Advanced Sensors**
  - Reprogrammable
  - Reconfigurable
  - Overlapping



## **NASA Earth Science**

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- **Role in the future grand architecture?**
- **What is the next big science question?**

**For Space and Exploration it is**

**Is there life out there?**

**Maybe for Earth it should be**

**Is there life here?**

# NRC / SSB Decadal Study

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## EARTH SCIENCE AND APPLICATIONS FROM SPACE

**"The SSB, in consultation with other units of the NRC, will lead a study to generate consensus from the Earth and environmental science and applications community regarding a systems approach to space-based and ancillary observations that encompasses the research programs of NASA and the related operational programs of NOAA. The study will be conducted in a manner similar to previous NRC "decadal Studies."**

- 1. Earth Science Applications and Societal Needs**
- 2. Land-use Change, Ecosystem Dynamics and Biodiversity**
- 3. Weather (incl. space weather and chemical weather)**
- 4. Climate Variability and Change**
- 5. Water Resources and the Global Hydrologic Cycle**
- 6. Human Health and Security**
- 7. Solid-Earth Hazards, Resources and Dynamics**